让我们共同打造气候中和的未来
Building a climate-neutral future together.

瑞士零碳建筑技术法规及标准的发展路径以及可提供中国借鉴的经验

Swiss Landscape of ZEB technical regulation and standards - Learnings for China

路枫博士，intep综合规划责任有限公司高级顾问， 中瑞零碳建筑项目副经理
Dr. Feng Lu-Pagenkopf
Senior Consultant, intep – integrale Planung GmbH
Deputy Team Leader of Sino-Swiss ZEB Project

中华人民共和国
住房和城乡建设部

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

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建筑性能技术法规的起源
Genesis of technical regulation on building performance

- **瑞士建筑业现况**
  Where does the Swiss building sector stand today

- **瑞士使建筑业达到净零排放的计划和战略**
  Plans and strategies for bringing the building sector to net-zero emissions

- **对中国可能有用的重要瑞士经验**
  Discussion: Key learnings that might be fruitful also for China

快速有效地实施零碳建筑
EFFECTIVELY IMPLEMENTING ZEB ON A FAST TRACK

Source: Schweizer Luftwaffe, 1989

当前挑战：
TODAY'S CHALLENGE:

建筑温室气体排放源自建筑整个生命周期的三个阶段：设计/建造，运营和废弃

Greenhouse gas emissions of buildings originate from all three phases of building life-cycle: Design/Construction, Operation and Decommissioning

实现温室气体净零排放需要在所有阶段的取得进展

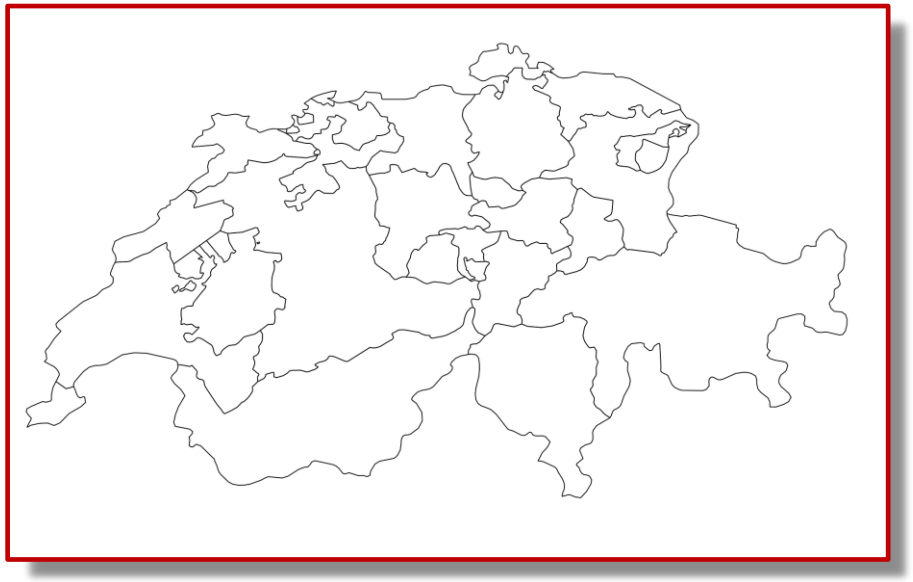
Reaching net-zero GHG emissions requires progress in all phases

减少运营阶段的排放是最快的路径

Reducing operation phase emissions is the fastest track

瑞士26个州分别对其建筑法规负责

26 CANTONS RESPONSIBLE FOR BUILDING REGULATION



Source: www.maxpixel.net

瑞士共有26个州

SWITZERLAND AND ITS 26 CANTONS

和中国“相似”，瑞士建筑领域的技术法规及监管也由26个州分别负责

The 26 cantons are responsible for technical regulation in the building sector, “similar” to China

瑞士北部高原气候温和潮湿，而阿尔卑斯山地区则很寒冷

Climate in northern plateau is moderate and damp, in alps cold

瑞士建筑技术法规专注供暖解决方案，由于气候变迁，制冷变得日趋重要

Focus of TER is on heating, cooling increasingly important due to climate change

瑞士零排放建筑的起步

GENESIS TOWARDS ZEB

Source: www.maxpixel.net

瑞士50多年来在零碳建筑路上的法规经验

50+ YEARS OF EXPERIENCE WITH TER ON THE WAY TO ZEB

1960-1972:确保舒适的室内微气候并预防结构受损

Ensuring a comfortable indoor climate and preventing structural damage

1973-1989:尝试和制定建筑热性能方面的技术法规

Piloting and anchoring technical regulation (TER) on thermal performance of buildings

1990-1993:统一技术法规并扩大高能效建筑市场

Harmonizing of TER and scaling up market for efficient buildings

瑞士零排放建筑的起步
GENESIS TOWARDS ZEB

Source: South-east view of NEST with its new unit UMAR | ©Zooey Brau... | Flickr

瑞士50多年在零碳建筑路上的法规经验
50+ YEARS OF EXPERIENCE WITH TER ON THE WAY TO ZEB

1994-2014:加强技术法规并转向可再生能源
Tightening TER and shift to Renewable Energies

2015-今天: 净零排放的法规和政策准备就绪
2015-today: Net-zero emission readiness of Regulation and Policies

将零碳法规整合在有效的政策环境里

REGULATION TO BE EMBEDDED IN A EFFECTIVE POLICY ENVIRONMENT

零碳建筑成功实施的三大柱

THREE PILLARS FOR SUCCESSFUL IMPLEMENTATION

标准规范， 立法和执法

Norms, legislation and enforcement

教育培训和能力建设

Information, education and capacity building

激励政策，领导力和积极鼓励

Incentives, leadership and motivation

包含零碳建筑要求的重要工具

IMPORTANT INSTRUMENT ADOPTING NZEB REQUIREMENTS

瑞士各州的法规范文（“MuKEn”）

MODEL REGULATIONS OF THE SWISS CANTONS (“MuKEn”)

符合有效实施低能耗建筑的详细解决方案

Descriptive solutions for compliance with TER for efficient implementation of low energy buildings

法规仅是有效政策方案的一个因素

REGULATION ONLY ONE ELEMENT OF EFFECTIVE POLICY DESIGN

建立措施生态体系 – 而不仅只是法规

ECOSYSTEM OF MEASURES – NOT ONLY REGULATION

法规措施（标准规范，技术规范等等）

Regulative Measures (Norms, TER,…)

财政措施（补贴，税收等等）

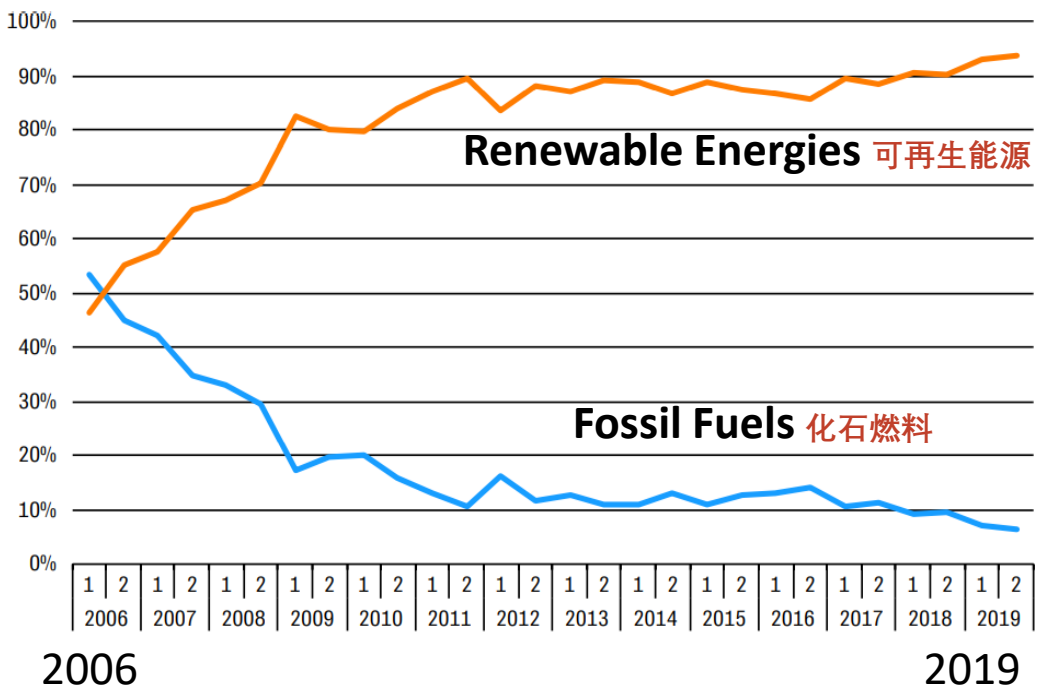
Financial Measures (Subsidies, Taxes, …)

配套措施（资讯，培训，科研等等）

Accompanying Measures (Information, Training, Research…)

可再生能源系统已主导新建建筑

RENEWABLE SYSTEMS DOMINATE IN NEW BUILDINGS



瑞士新建建筑能源的市场份额

MARKET SHARE OF ENERGY SOURCES IN NEW BUILDINGS

瑞士新建建筑正在成为近零碳和零碳的路上

New buildings are on track for NZEB and ZEB

自2010年以来，瑞士90%的新建住宅建筑已使用可再生能源

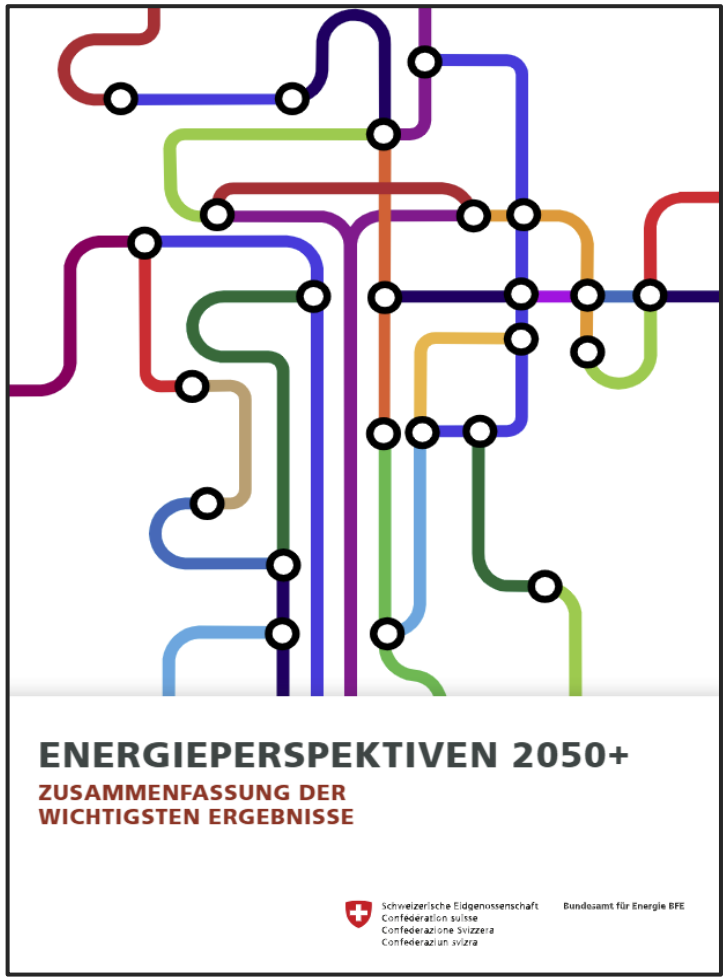
90% of new residential buildings have renewable energies since~2010

挑战在于改造既有建筑

The challenge lies in transforming existing building stock

2050年瑞士有可能实现净零排放

ACHIVIEVING NET-ZERO EMISSIONS IN SWITZERLAND BY 2050 IS POSSIBLE



能源展望 2050+

ENERGY PERSPECTIVES 2050+

2050年瑞士的净零目标

Objectives for net-zero in Switzerland by 2050

需要将脱碳和可再生电能联系起来

Need for interlinking decarbonization and renewable electricity

在园区层面上实施跨领域耦合和优化措施的发展趋势

Trend towards sector coupling and optimization on a district level

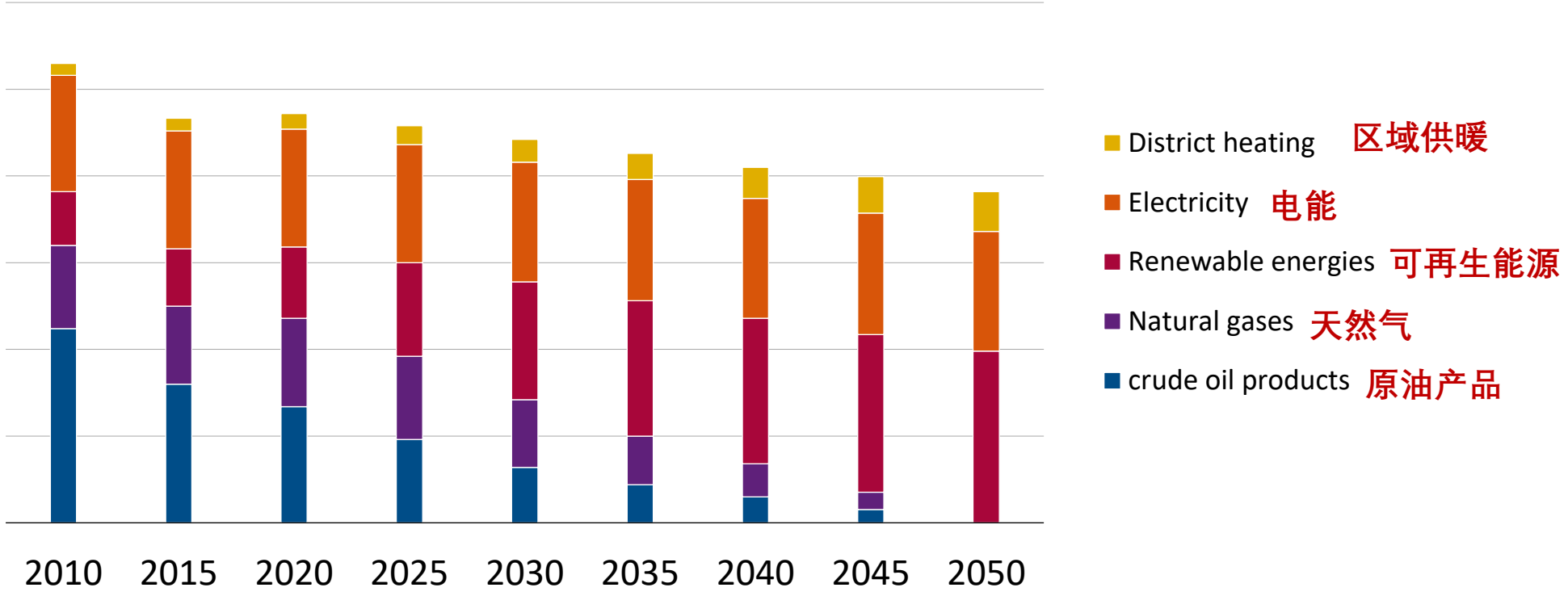
2050+ 能源远景展望 - 重要成果汇集

2050年最重要的能源：可再生能源，社区供暖和电能

MOST IMPORTANT SOURCES 2050: RENEWABLE ENERGIES, DISTRICT HEATING AND ELECTRICITY

居住建筑的能耗发展：

DEVELOPMENT OF ENERGY CONSUMPTION FOR RESIDENTIAL BUILDINGS:



Source: Energy Perspectives 2050+

简单有效的法规 涵盖全生命周期排放

SIMPLE AND EFFECTIVE REGULATION COVERING LIFE-CYCLE EMISSIONS

Source: www.video-drohne.ch

瑞士建筑领域未来法规方案

CONCEPTS FOR FUTURE REGULATION IN SWISS BUILDINGSECTOR

规划建造阶段：设定能源系统最大输出热功率的额定值 – 来表示建筑能效 – 而不再直接看建筑能耗

Planning Phase: Set limits for maximum deliverable thermal power output of the energy system - a proxy for the energy efficiency of the building - rather than directly for energy consumption

比以往简单多了 → **simpler**

运营阶段：通过设定每单位建筑面积的CO2额定值来调控能源组合

Operating phase: Regulate energy mix by setting CO_2-limits per floor area

高度灵活 → **highly flexible**

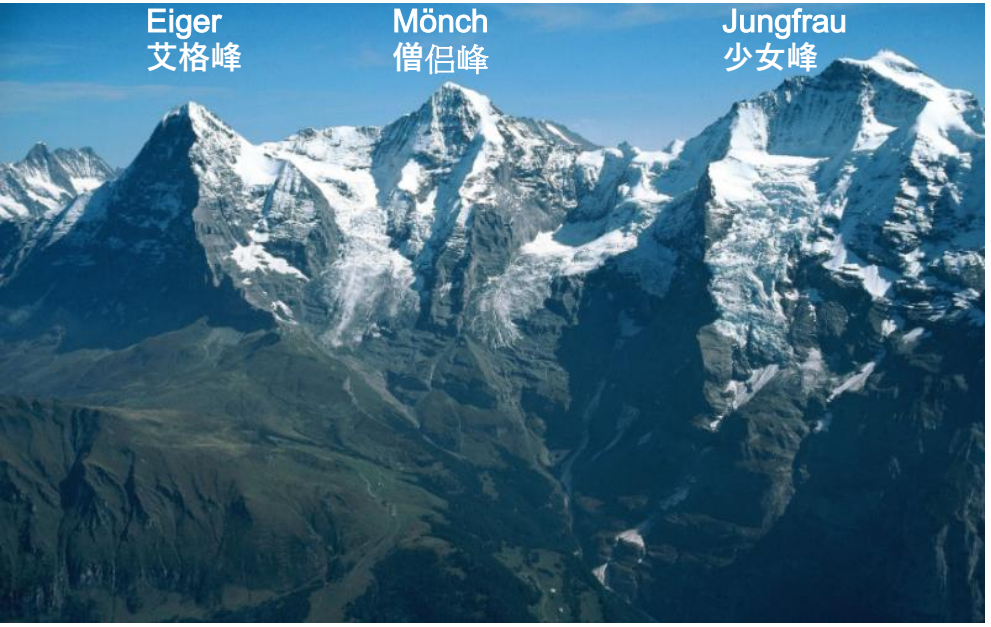
废弃阶段：对建材预收基于“隐含能耗”的建材回收再用费

Decommissioning phase: Upfront recycling fee for building materials based on “embodied emissions”

循环经济 → **circular economy**

零碳示范项目成为重要贡献

LIGHTHOUSE PROJECTS FOR ZEB AS IMPORTANT CONTRIBUTORS



Source: Schweizer Luftwaffe, 1989

接受挑战，成为领跑者

TAKE UP THE CHALLENGE AND BE A FRONTRUNNER

我们当务之急的职责是需尽快推动建筑领域达到零碳目标 – 因此，您的贡献至关重要!

There is high importance and urgency to transform the building sector to ZEB in near time – this is where your contribution will become crucial.

让我们共同打造气候中和的未来
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感 谢

Thanks

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